

ABSTRACT

[071] Methods and apparatus for providing connection packages for high-speed integrated circuits ("ICs") in optical, electronic, wired or wireless communications are disclosed. The connection package achieves dimensional transformation of signal routes from high-speed, high-density IC's input/output pads to the external terminals such as coaxial terminals and BGA balls, while maintaining constant characteristic impedance throughout the transmission lines. A package may include a substrate having microstrips for communicating signals between the IC pads and external terminals. A pair of differential microstrips can be positioned closer to each other near the IC pads and create capacitive coupling. Such coupled capacitance allows the width of the microstrips to be reduced. A portion of the coupled microstrips near the IC pads can be widened to increase the capacitance so that the overall transmission path can become an all-pass network--from the IC pads, through the bonding wires, to the microstrips. The rest of the portions of the microstrips can be tapered out to their respective external connectors. In addition, a multi-layer package may include a substrate, at least one coaxial external terminal formed at the side of the package for conducting a high-speed signal, BGA connectors formed at the bottom of the package for conducting low-speed signals, a microstrip for connecting the high-speed signal to the coaxial terminal, and microstrips and internal coaxial connectors for connecting the low-speed signals to the BGA connectors. Substantially constant characteristic impedance is achieved throughout the signal transmission paths in the package.